

CLAIMS:

1. A cold hearth melting and refining arrangement comprising:
a cold hearth configured to hold a pool of molten material;
an electron gun configured to generate an electron beam; and
a programmable device coupled to the electron gun, wherein the programmable device and the electron gun are configured so that the electron beam sweeps along at least a portion of the perimeter of the pool of molten material.
2. The cold hearth melting and refining arrangement of claim 1, wherein the programmable device and the electron gun are configured so that the electron beam sweeps continuously along at least a portion of the perimeter of the pool of molten material.
3. The cold hearth melting and refining arrangement of claim 2, wherein the electron beam circumscribes the portion of the perimeter of the pool of molten material with a time period that is in the range of about one millisecond to about several seconds.
4. The cold hearth melting and refining arrangement of claim 1, wherein the programmable device and the electron gun are configured so that the electron beam sweeps along at least a portion of the perimeter of the pool of molten material in a step-and-scan mode.
5. The cold heart melting and refining arrangement of claim 1 wherein a dwell time of the electron beam at a spot between steps is in the range of about one millisecond to about hundreds of milliseconds.

6. The cold hearth melting and refining arrangement of claim 1 wherein the electron beam delivers energy to clear the portion of the perimeter of the pool of molten material of volatile impurities that evaporate from the pool of molten material and recondense on the perimeter.

7. A method of cleaning a perimeter of a pool of molten material in a cold hearth melting and refining arrangement, comprising
utilizing an electron gun to generate an electron beam; and
sweeping a portion of the perimeter of the liquid pool with the electron beam,
whereby volatile impurities that evaporate from the pool of molten material and recondense on the perimeter are dispersed.